LISTING OF THE CLAIMS

This listing, if entered, replaces all prior versions of the claims.

1. (Previously Presented) A method of managing network communication comprising:

terminating a first transmission control protocol ("TCP") connection at a first network element, wherein said first TCP connection is between said first network element and a second network element, and said first TCP connection is intended to be terminated at a third network element;

initiating a second TCP connection between said first network element and a third network element;

establishing communications between said second and said third network elements via said first network element;

determining need for data transfer between said second and said third network elements by monitoring an amount of space available in at least one of a plurality of data buffers; and

transferring said data between said second and said third network elements.

2. (Original) The method of claim 1, wherein said second network element initiates said first TCP connection for said third network element.

3. (Original) The method of claim 1, wherein said communications between said second and said third network elements are established using said first and said second TCP connections.

4. (Original) The method of claim 1, wherein said communications between said second and said third network elements forms an end-to-end TCP connection.

5. (Original) The method of claim 1, wherein said first network element is a proxy server.

6. (Original) The method of claim 1, wherein a control unit of said proxy

server monitors said plurality of buffers.

7. (Original) The method of claim 1, wherein said control unit transfers said data between said second and said third network elements.

8. (Original) The method of claim 1, wherein said proxy server supports transparent communications between said second and said third network elements.

9. (Previously Presented) The method of claim 1, wherein at least one of said plurality of data buffers is a receive buffer.

10. (Previously Presented) The method of claim 1, wherein at least one of said plurality of data buffers is a transmit buffer.

11. (Previously Presented) The method of claim 9, wherein said receive buffer is pre-allocated.

12. (Previously Presented) The method of claim 9, wherein said receive buffer is dynamically allocated.

13. (Original) The method of claim 10, wherein said transmit buffer is pre-allocated.

14. (Original) The method of claim 10, wherein said transmit buffer is dynamically allocated.

15. (Original) The method of claim 1, wherein said second network element is one of a plurality of clients.

16. (Original) The method of claim 1, wherein one of a plurality of applications on said client initiates said first TCP connection for said client.

17. (Original) The method of claim 1, wherein said third network element is

one of a plurality of servers.

18. (Original) The method of claim 1, wherein a data switching unit of said proxy server determines which one of said plurality of servers to use for said second TCP connection.

19. (Original) The method of claim 1, further comprising:
monitoring said first TCP connection.

20. (Original) The method of claim 19, further comprising:
receiving a request for data from said application; and
determining whether said request requires said second TCP connection with one of said plurality of servers.

21. (Original) The method of claim 20, wherein data switching unit receives said request for data via said control unit.

22. (Original) The method of claim 20, wherein said determining of said second TCP connection is done by said data switching unit.

23. (Original) The method of claim 20, further comprising:
if said request does not require said second TCP connection with one of said plurality of servers,
servicing said request for data, and
closing said connection with said client.

24. (Original) The method of claim 23, wherein said request for data is served by passing data from said data switching unit to said control unit for transmission to said application on said client.

25. (Original) The method of claim 23, further comprising:
if said request requires said second TCP connection with one of said plurality of servers,

selecting a first server from said plurality of servers, and

initiating said second TCP connection with said first server.

26. (Original) The method of claim 25, wherein said application requests said end-to-end TCP connection with said first server.

27. (Previously Presented) The method of claim 25, further comprising:

receiving said data on said second TCP connection from said first server;

storing said data in said receive buffer of said second TCP connection;

transferring said data from said receive buffer to said transmit buffer of said first TCP connection;

monitoring space in said transmit buffer; and

if said transmit buffer has space,

determining whether said first TCP connection needs additional data.

28. (Previously Presented) The method of claim 27, further comprising:

if said first TCP connection needs said additional data,

requesting said additional data from said first server; and

repeating said steps of receiving, storing, transferring, monitoring and determining until said request for data from said application is served.

29. (Original) The method of claim 28, wherein said additional data is transferred into said transmit buffer without a request for said additional data.

30. (Original) The method of claim 28, further comprising:

if said request for data from said application is served,

closing said first TCP connection with said client.

31. (Original) The method of claim 30, wherein said closing of said connection is done by said control unit upon a receiving a request for closing said connection from said data switching unit.

32. (Previously Presented) A network device comprising:

terminate a first transmission control protocol ("TCP") connection at a first network element, wherein said first TCP connection is between said first network element and a second network element, and said first TCP connection is intended to be terminated at a third network element;

initiate a second TCP connection between said first network element and a third network element;

establish communications between said second and said third network elements via said first network element;

determine need for data transfer between said second and said third network elements by monitoring an amount of space available in at least one of a plurality of data buffers; and

transfer said data between said second and said third network elements.

33. (Original) The network device of claim 32, wherein said second network element initiates said first TCP connection for said third network element.

34. (Original) The network device of claim 32, wherein said communications between said second and said third network elements are established using said first and said second TCP connections.

35. (Original) The network device of claim 32, wherein said communications between said second and said third network elements forms an end-to-end TCP connection.

36. (Original) The network device of claim 32, wherein said first network element is a proxy server.

37. (Original) The network device of claim 32, wherein a control unit of said proxy server monitors said plurality of buffers.

38. (Original) The network device of claim 32, wherein said control unit transfers said data between said second and said third network elements.

39. (Original) The network device of claim 32, wherein said proxy server supports transparent communications between said second and said third network elements.

40. (Original) The network device of claim 32, wherein at least one of said plurality of buffers is a receive buffer.

41. (Original) The network device of claim 32, wherein at least one of said plurality of buffers is a transmit buffer.

42. (Previously Presented) The network device of claim 40, wherein said receive buffer is pre-allocated.

43. (Previously Presented) The network device of claim 40, wherein said receive buffer is dynamically allocated.

44. (Original) The network device of claim 41, wherein said transmit buffer is pre-allocated.

45. (Original) The network device of claim 41, wherein said transmit buffer is dynamically allocated.

46. (Original) The network device of claim 32, wherein said second network element is one of a plurality of clients.

47. (Original) The network device of claim 32, wherein one of a plurality of applications on said client initiates said first TCP connection for said client.

48. (Original) The network device of claim 32, wherein said third network element is one of a plurality of servers.

49. (Original) The network device of claim 32, wherein a data switching unit of said proxy server determines which one of said plurality of servers to use for said second TCP connection.

50. (Original) The network device of claim 32, wherein said processor is further configured to monitor said first TCP connection.

51. (Original) The network device of claim 50, wherein said processor is further configured to receive a request for data from said application; and determine whether said request requires said second TCP connection with one of said plurality of servers.

52. (Original) The network device of claim 51, wherein data switching unit receives said request for data via said control unit.

53. (Original) The network device of claim 51, wherein said determining of said second TCP connection is done by said data switching unit.

54. (Original) The network device of claim 51, wherein said processor is further configured to if said request does not require said second TCP connection with one of said plurality of servers,

service said request for data, and

close said connection with said client.

55. (Original) The network device of claim 54, wherein said request for data is served by passing data from said data switching unit to said control unit for transmission to said application on said client.

56. (Original) The network device of claim 54, wherein said processor is further configured to if said request requires said second TCP connection with one of said plurality of servers,

select a first server from said plurality of servers, and

initiate said second TCP connection with said first server.

57. (Original) The network device of claim 56, wherein said application requests said end-to-end TCP connection with said first server.

58. (Previously Presented) The network device of claim 56, wherein said processor is further configured to receive said data on said second TCP connection from said first server;

store said data in said receive buffer of said second TCP connection;

transfer said data from said receive buffer to said transmit buffer of said first TCP connection;

monitor space in said transmit buffer; and

if said transmit buffer has space,

determine whether said first TCP connection needs additional data.

59. (Previously Presented) The network device of claim 58, wherein said processor is further configured to if said first TCP connection needs said additional data,

request said additional data from said first server; and

repeat said steps of receiving, storing, transferring, monitoring and determining until said request for data from said application is served.

60. (Original) The network device of claim 59, wherein said additional data is transferred into said transmit buffer without a request for said additional data.

61. (Original) The network device of claim 59, wherein said processor is further configured to if said request for data from said application is served,

close said first TCP connection with said client.

62. (Original) The network device of claim 61, wherein said closing of said connection is done by said control unit upon a receiving a request for closing said connection from said data switching unit.

63. (Previously Presented) A network device comprising:

means for terminating a first transmission control protocol ("TCP") connection at a first network element, wherein said first TCP connection is between said first network element and a second network element, and said first TCP

connection is intended to be terminated at a third network element;

means for initiating a second TCP connection between said first network element and a third network element;

means for establishing communications between said second and said third network elements via said first network element;

means for determining need for data transfer between said second and said third network elements by monitoring an amount of space available in at least one of a plurality of data buffers; and

means for transferring said data between said second and said third network elements.

64. (Original) The network device of claim 63, wherein said second network element initiates said first TCP connection for said third network element.

65. (Original) The network device of claim 63, wherein said communications between said second and said third network elements are established using said first and said second TCP connections.

66. (Original) The network device of claim 63, wherein said communications between said second and said third network elements forms an end-to-end TCP connection.

67. (Original) The network device of claim 63, wherein said first network element is a proxy server.

68. (Original) The network device of claim 63, wherein a control unit of said proxy server monitors said plurality of buffers.

69. (Original) The network device of claim 63, wherein said control unit transfers said data between said second and said third network elements.

70. (Original) The network device of claim 63, wherein said proxy server supports transparent communications between said second and said third network elements.

71. (Original) The network device of claim 63, wherein at least one of said plurality of buffers is a receive buffer.

72. (Previously Presented) The network device of claim 63, wherein at least one of said plurality of buffers is a transmit buffer.

73. (Previously Presented) The network device of claim 71, wherein said receive buffer is pre-allocated.

74. (Previously Presented) The network device of claim 71, wherein said receive buffer is dynamically allocated.

75. (Original) The network device of claim 72, wherein said transmit buffer is pre-allocated.

76. (Original) The network device of claim 72, wherein said transmit buffer is dynamically allocated.

77. (Previously Presented) The network device of claim 63, wherein said second network element is one of a plurality of clients.

78. (Previously Presented) The network device of claim 63, wherein one of a plurality of applications on said client initiates said first TCP connection for said client.

79. (Previously Presented) The network device of claim 63, wherein said third network element is one of a plurality of servers.

80. (Previously Presented) The network device of claim 63, wherein a data switching unit of said proxy server determines which one of said plurality of servers to use for said second TCP connection.

81. (Previously Presented) The network device of claim 63, further comprising:

means for monitoring said first TCP connection.

82. (Original) The network device of claim 81, further comprising:
means for receiving a request for data from said application; and
means for determining whether said request requires said second TCP connection with one of said plurality of servers.

83. (Original) The network device of claim 82, wherein data switching unit receives said request for data via said control unit.

84. (Original) The network device of claim 82, wherein said determining of said second TCP connection is done by said data switching unit.

85. (Original) The network device of claim 82, further comprising:
means for servicing said request for data if said request does not require said second TCP connection with one of said plurality of servers; and
means for closing said connection with said client if said request does not require said second TCP connection with one of said plurality of servers.

86. (Original) The network device of claim 85, wherein said request for data is served by passing data from said data switching unit to said control unit for transmission to said application on said client.

87. (Original) The network device of claim 85, further comprising:
means for selecting a first server from said plurality of servers if said request requires said second TCP connection with one of said plurality of servers; and
means for initiating said second TCP connection with said first server if said request requires said second TCP connection with one of said plurality of servers.

88. (Original) The network device of claim 87, wherein said application requests said end-to-end TCP connection with said first server.

89. (Previously Presented) The network device of claim 87, further comprising:

means for receiving said data on said second TCP connection from said first server;

means for storing said data in said receive buffer of said second TCP connection;

means for transferring said data from said receive buffer to said transmit buffer of said first TCP connection;

means for monitoring space in said transmit buffer; and

means for determining whether said first TCP connection needs additional data if said transmit buffer has space.

90. (Previously Presented) The network device of claim 89, further comprising:

means for requesting said additional data from said first server if said first TCP connection needs said additional data;

means for repeating said steps of receiving, storing, transferring, monitoring if said first TCP connection needs said additional data; and

means for determining until said request for data from said application is served.

91. (Original) The network device of claim 90, wherein said additional data is transferred into said transmit buffer without a request for said additional data.

92. (Original) The network device of claim 90, further comprising:

means for closing said first TCP connection with said client if said request for data from said application is served.

93. (Original) The network device of claim 92, wherein said closing of said connection is done by said control unit upon a receiving a request for closing said connection from said data switching unit.

94. (Previously Presented) A computer program product for managing network communication, encoded in computer readable media, said program

product comprising a set of instructions executable on a computer system, said set of instructions configured to

terminate a first transmission control protocol ("TCP") connection at a first network element, wherein said first TCP connection is between said first network element and a second network element, and said first TCP connection is intended to be terminated at a third network element;

initiate a second TCP connection between said first network element and a third network element;

establish communications between said second and said third network elements via said first network element;

determine need for data transfer between said second and said third network elements by monitoring an amount of space available in at least one of a plurality of data buffers; and

transfer said data between said second and said third network elements.

95. (Original) The computer program product of claim 94, wherein said second network element initiates said first TCP connection for said third network element.

96. (Original) The computer program product of claim 94, wherein said communications between said second and said third network elements are established using said first and said second TCP connections.

97. (Original) The computer program product of claim 94, wherein said communications between said second and said third network elements forms an end-to-end TCP connection.

98. (Original) The computer program product of claim 94, wherein said first network element is a proxy server.

99. (Original) The computer program product of claim 94, wherein a control unit of said proxy server monitors said plurality of buffers.

100. (Original) The computer program product of claim 94, wherein said control unit transfers said data between said second and said third network elements.

101. (Original) The computer program product of claim 94, wherein said proxy server supports transparent communications between said second and said third network elements.

102. (Original) The computer program product of claim 94, wherein at least one of said plurality of buffers is a receive buffer.

103. (Original) The computer program product of claim 94, wherein at least one of said plurality of buffers is a transmit buffer.

104. (Original) The computer program product of claim 102, wherein said receive buffer is pre-allocated.

105. (Original) The computer program product of claim 102, wherein said receive buffer is dynamically allocated.

106. (Original) The computer program product of claim 103, wherein said transmit buffer is pre-allocated.

107. (Original) The computer program product of claim 103, wherein said transmit buffer is dynamically allocated.

108. (Original) The computer program product of claim 94, wherein said second network element is one of a plurality of clients.

109. (Original) The computer program product of claim 94, wherein one of a plurality of applications on said client initiates said first TCP connection for said client.

110. (Original) The computer program product of claim 94, wherein said third network element is one of a plurality of servers.

111. (Original) The computer program product of claim 94, wherein a data switching unit of said proxy server determines which one of said plurality of servers to use for said second TCP connection.

112. (Original) The computer program product of claim 94, wherein said set of instructions is further configured to:
monitor said first TCP connection.

113. (Original) The computer program product of claim 112, wherein said set of instructions is further configured to:
receive a request for data from said application; and
determine whether said request requires said second TCP connection with one of said plurality of servers.

114. (Original) The computer program product of claim 113, wherein data switching unit receives said request for data via said control unit.

115. (Original) The computer program product of claim 113, wherein said determining of said second TCP connection is done by said data switching unit.

116. (Previously Presented) The computer program product of claim 113, wherein said set of instructions is further configured to:
if said request does not require said second TCP connection with one of said plurality of servers,
service said request for data, and
close said connection with said client.

117. (Original) The computer program product of claim 116, wherein said request for data is served by passing data from said data switching unit to said control unit for transmission to said application on said client.

118. (Original) The computer program product of claim 116, wherein said set of instructions is further configured to :

if said request requires said second TCP connection with one of said plurality of servers,

select a first server from said plurality of servers, and

initiate said second TCP connection with said first server.

119. (Original) The computer program product of claim 118, wherein said application requests said end-to-end TCP connection with said first server.

120. (Previously Presented) The computer program product of claim 118, wherein said set of instructions is further configured to:

receive said data on said second TCP connection from said first server;

store said data in said receive buffer of said second TCP connection;

transfer said data from said receive buffer to said transmit buffer of said first TCP connection;

monitor space in said transmit buffer; and

if said transmit buffer has space,

determine whether said first TCP connection needs additional data.

121. (Previously Presented) The computer program product of claim 120, wherein said set of instructions is further configured to:

if said first TCP connection needs said additional data,

request said additional data from said first server; and

repeat said steps of receiving, storing, transferring, monitoring and determining until said request for data from said application is served.

122. (Original) The computer program product of claim 121, wherein said additional data is transferred into said transmit buffer without a request for said additional data.

123. (Original) The computer program product of claim 121, wherein said set of instructions is further configured to :

if said request for data from said application is served,

close said first TCP connection with said client.

124. (Original) The computer program product of claim 123, wherein said closing of said connection is done by said control unit upon a receiving a request for closing said connection from said data switching unit.